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Mazzoli

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(54) **MULTI-FUNCTIONAL CARRIAGE**

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F16M 11/04 (2006.01)
F16M 3/00 (2006.01)
B25H 1/00 (2006.01)

(52) **U.S. Cl.**
CPC ***F16M 3/00*** (2013.01); ***B25H 1/00*** (2013.01)

(58) **Field of Classification Search**
USPC 248/639, 640, 642, 646, 651, 653, 654, 248/657, 671, 672, 678, 346.01, 346.02, 248/346.03
See application file for complete search history.

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(57) **ABSTRACT**

A multi-functional carriage includes: a support frame provided with wheels; an internal combustion engine able to actuate an air compressor and an electrical current generator. The internal combustion engine, the air compressor and the electrical current generator are installed on-board the support frame. The support frame includes a gripping apparatus able to engage and raise a harnessing frame for various devices.

7 Claims, 5 Drawing Sheets

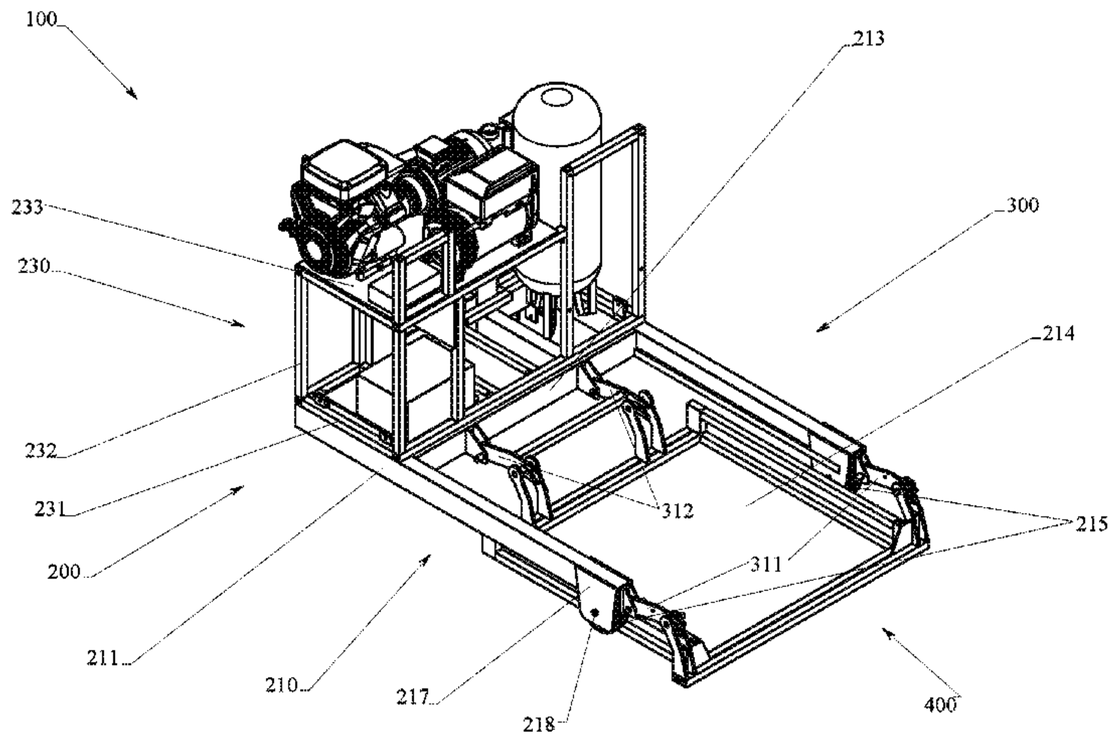
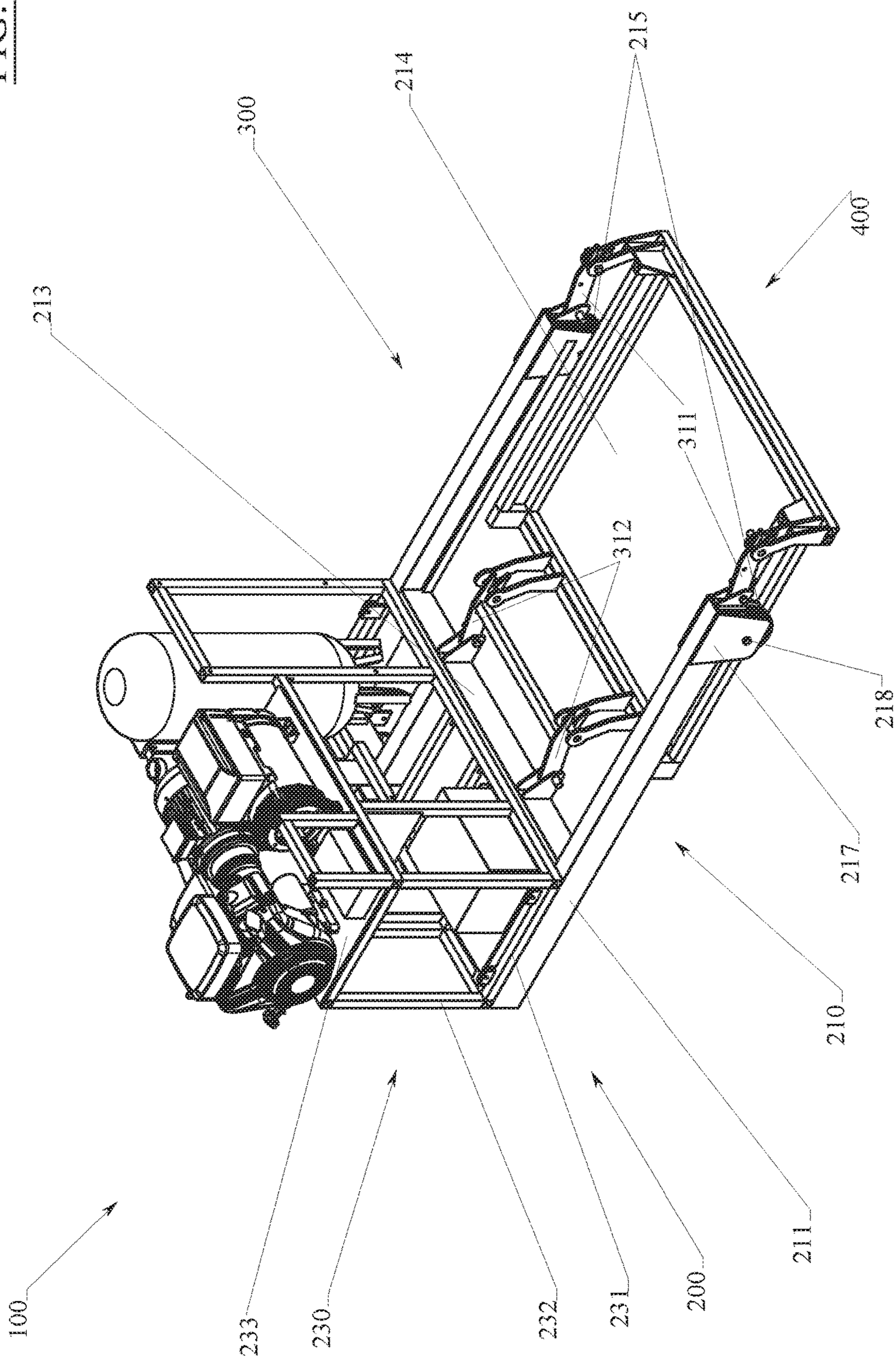


FIG.1


300
214
215
400
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311
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210
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200
211

FIG.2

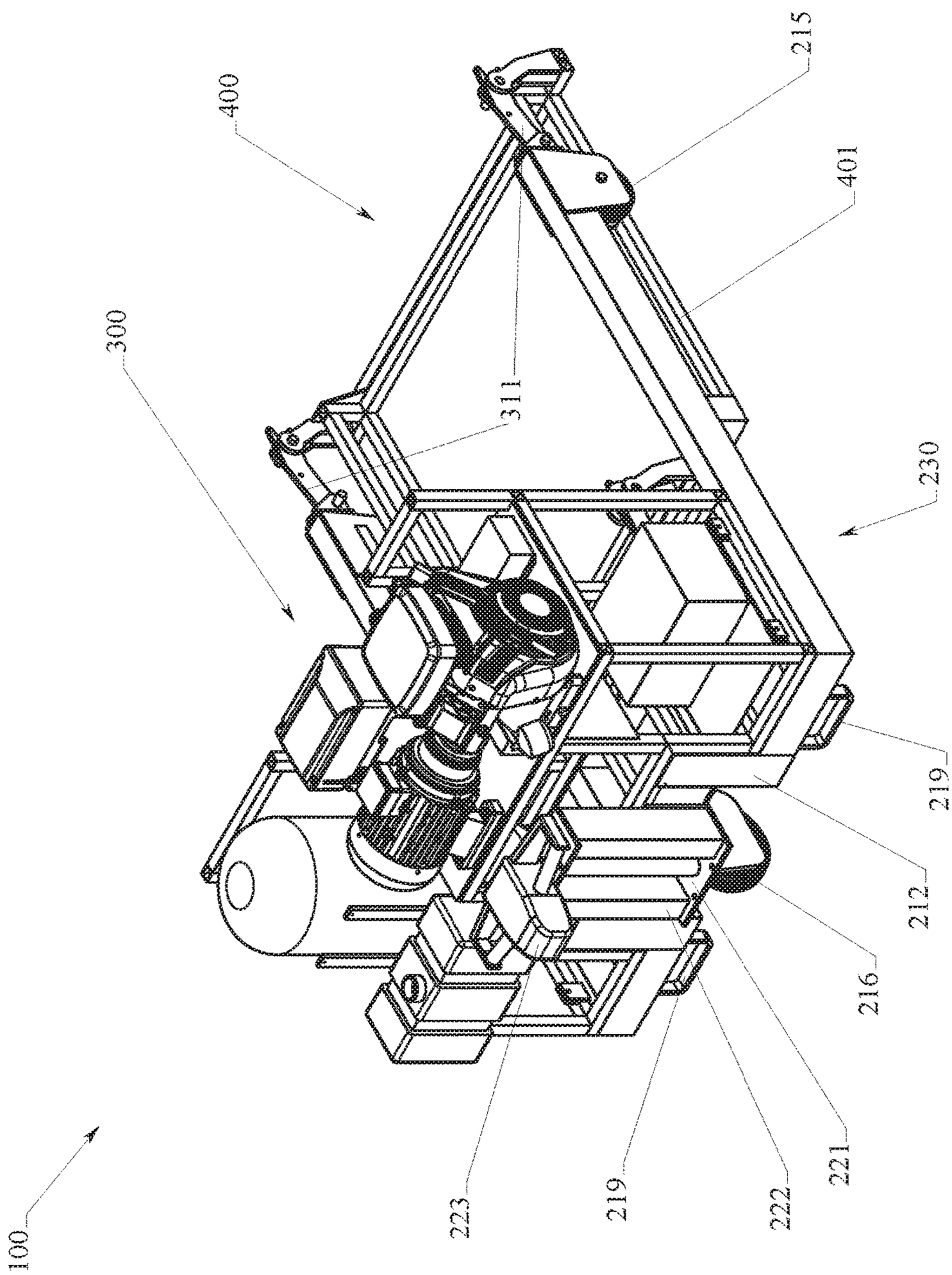
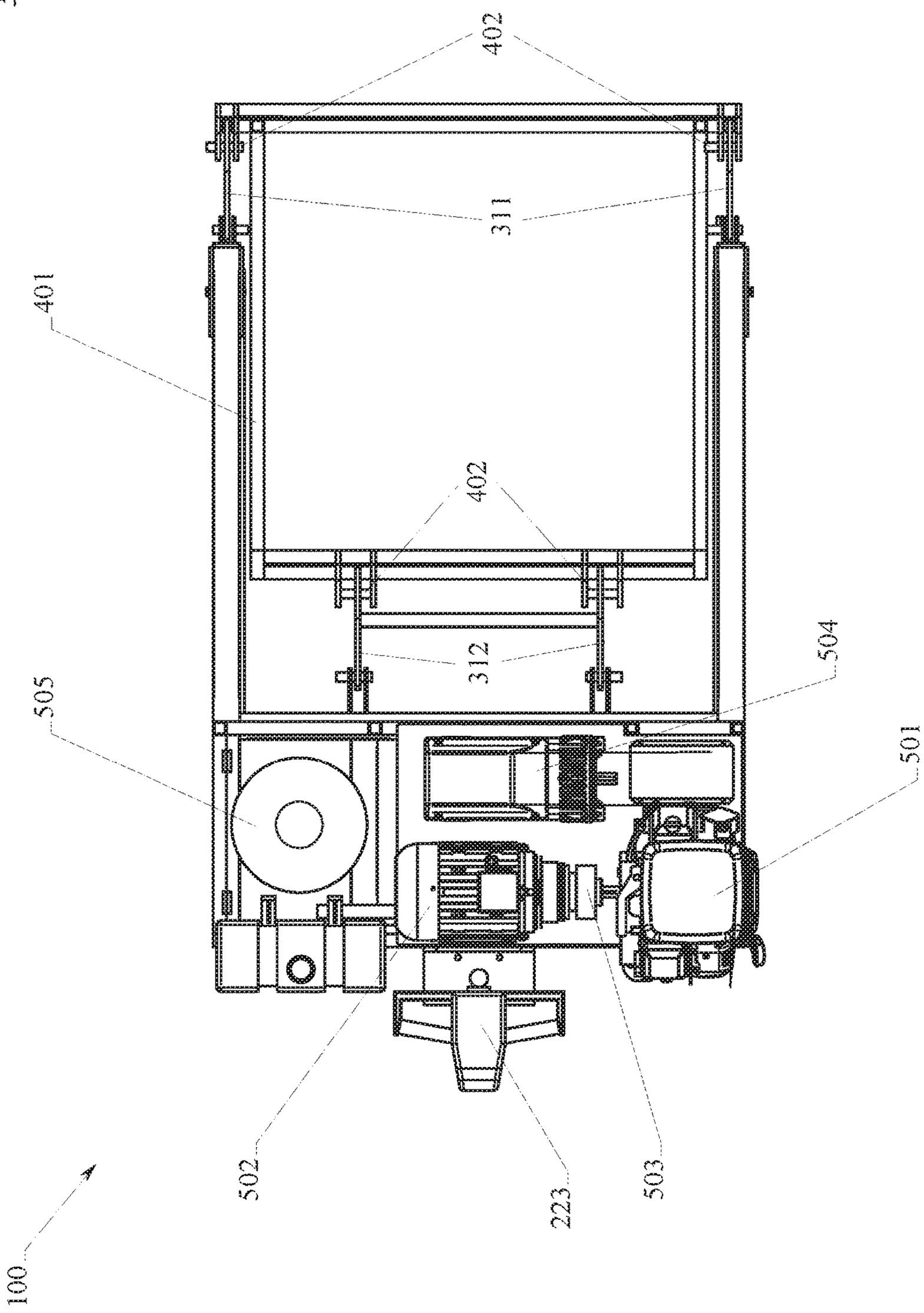


FIG.3



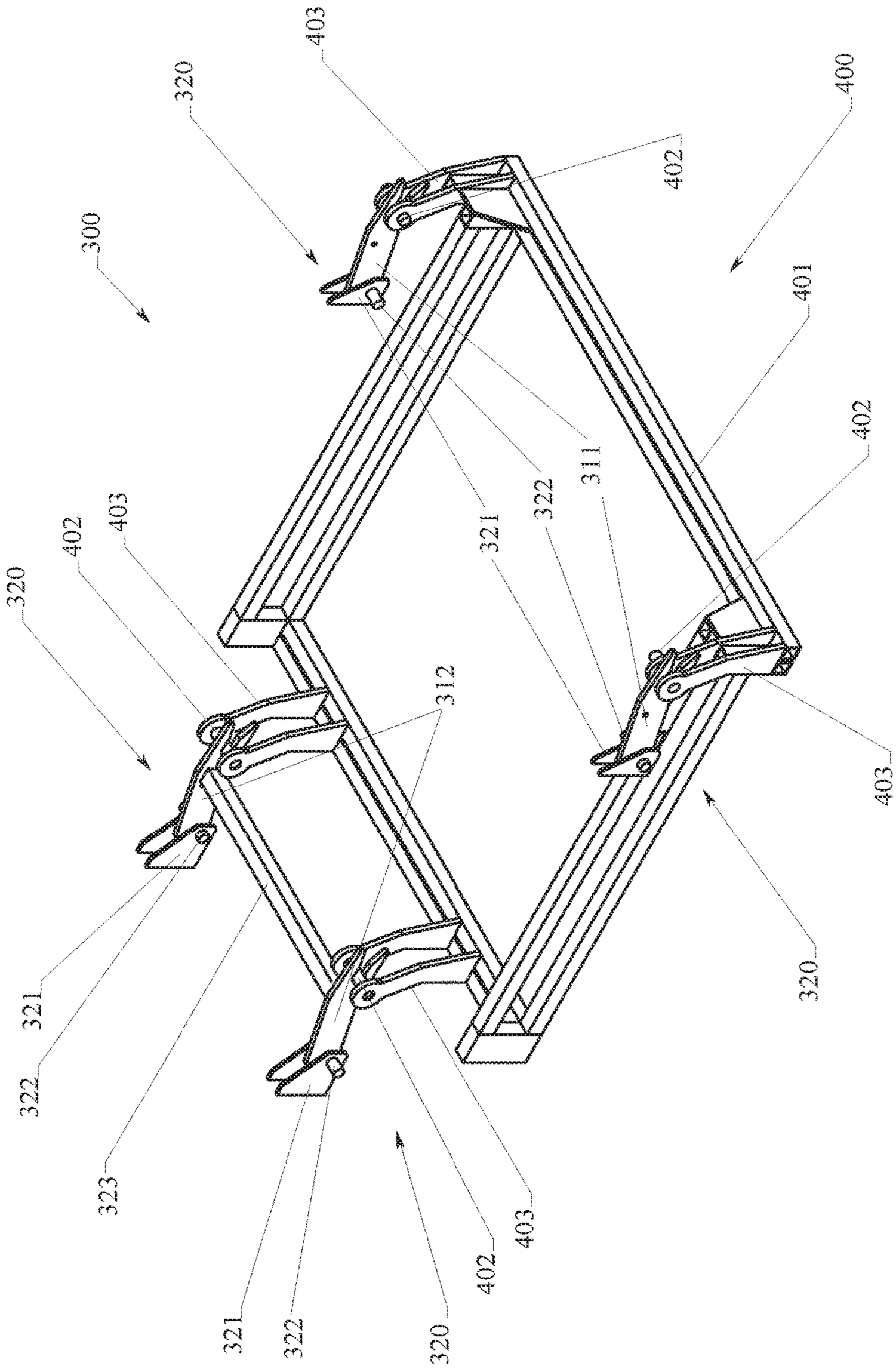


FIG.4

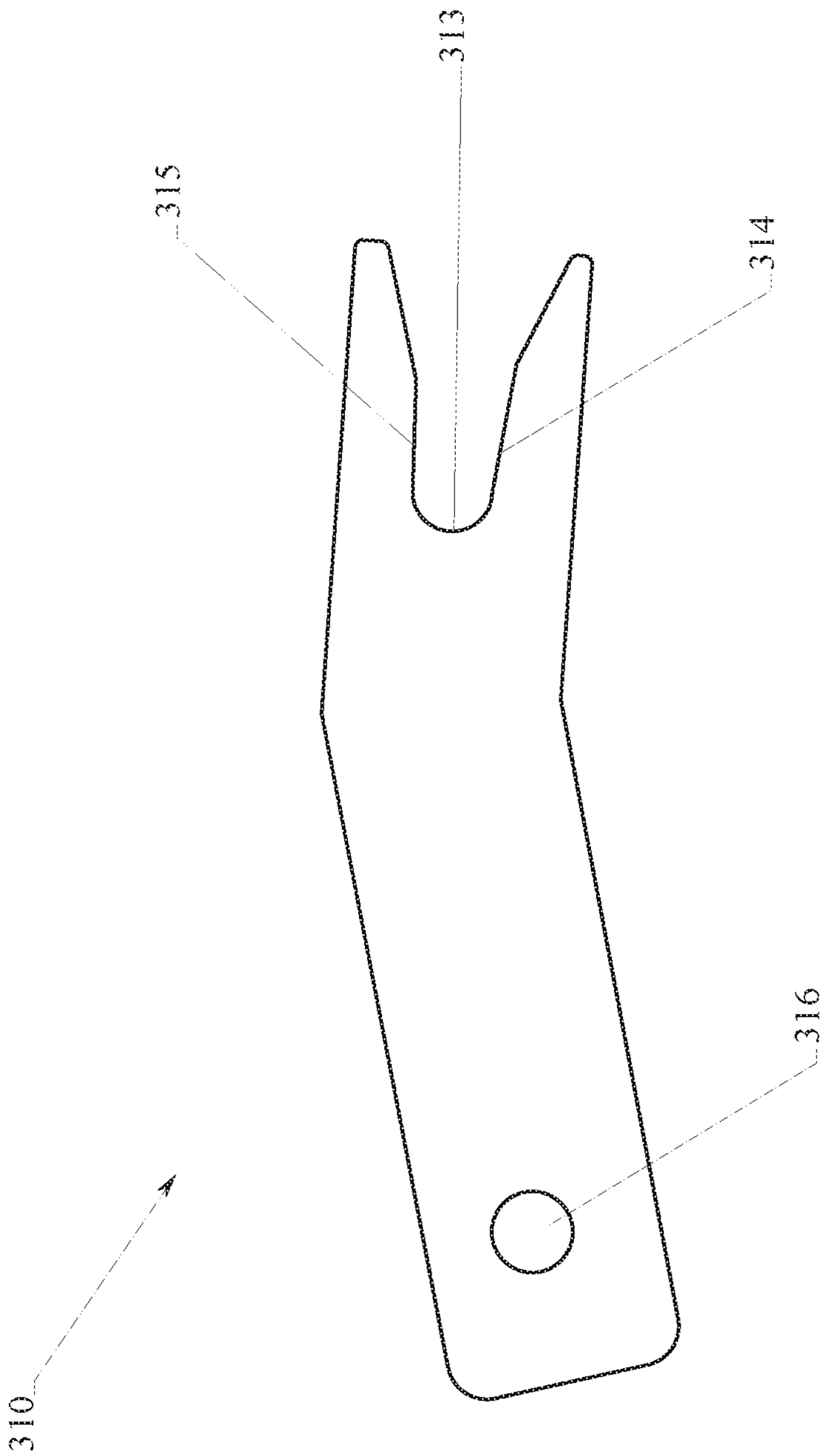


FIG.5

MULTI-FUNCTIONAL CARRIAGE

TECHNICAL FIELD

The present invention relates to a multifunctional carriage.

In particular, the present invention relates to a multifunctional carriage able to be housed internally of a load compartment of a vehicle.

BACKGROUND

As is known, in the automotive sector there exist trucks equipped with all the tools necessary for carrying out repair interventions on motor vehicles or other vehicles outside the workshop; these are known as mobile workshops.

In particular, some of the mobile workshops are equipped so as to enable on-the-spot aid to motorists and lorry-drivers stranded after a breakdown due to punctures and/or mechanical faults.

In this sector, the prior art comprises self-propelling carriages, provided with wheels, on which some devices are installed that are necessary for aid operations and which can be housed internally of the mobile workshops.

With the presence of the wheels, the self-propelling carriage can be moved both internally and externally of the truck in order to reach the most favorable use position, as well as being loadable and unloadable from the truck compartment by use of a simple chute.

A known example of self-propelling carriage for a mobile workshop is structured so as to be able to provide assistance in a case of a tire puncture.

Usually installed on the carriage are: a tire changer for demounting or re-mounting a tire from/onto a rim, a compressor for inflating the tire and auxiliary equipment such as for example tools for demounting the tire from the wheel hub.

The tire-changer and the compressor are generally activated by means of electric motors. Consequently with the aim of guaranteeing operability even when it is not possible to connect up to the electricity grid, the self-propelling carriage is also provided with an internal combustion engine which activates a current generator able to power all the electrical devices that are installed on the carriage.

With respect to the traditional fixed installation of a tire changer and relative auxiliary apparatus internally of the truck, the above-described carriage has the advantage of enabling interventions in places where for reasons of traffic or space it is not possible to park the mobile workshop in proximity of the vehicle which is to be serviced. To this can be added the advantage that particularly large tires such as those fitted on articulated trucks are moved much more easily outside the mobile workshop, and the self-propelling carriages enable this to be done.

Although these carriages enable greater versatility and facility of use with respect to the traditional fixed installation, they are anti-economic in cases in which the mobile workshop needs to transport different devices.

For example, a mobile workshop that intervenes in cases of both motor vehicles and articulated trucks requires a tire-changer for motor vehicles and a tire-changer for articulated lorry tires, which for questions of size cannot be positioned on a same carriage.

Consequently two carriages are necessary, each having an internal combustion engine, compressor and so on.

The same is true in cases where other large and/or heavy devices for repairing vehicles are to be transported.

An aim of the present invention is to provide carriage able to obviate the above-mentioned drawbacks in the prior art, with a solution that is simple, rational and relatively inexpensive.

The aims are attained by the characteristics of the invention as reported in the independent claim. The dependent claims delineate preferred and/or particularly advantageous aspects of the invention.

SUMMARY

As a solution to the above-cited drawbacks, the invention discloses a multi-functional carriage comprising: a support frame provided with wheels; an internal combustion engine able to actuate an air compressor and an electrical current generator, wherein the internal combustion engine, the air compressor and the electrical current generator are installed on-board the support frame; where the support frame comprises a gripping apparatus able to engage and raise a harnessing frame for various devices.

With this solution it is possible to move various devices with a single carriage. It is further possible to provide modules containing a plurality of devices, associated to a single harnessing frame and therefore contemporaneously transportable.

In a further aspect of the invention, the harnessing frame comprises a perimeter border fixable to the devices.

In this way the harnessing frame can be solidly associated to the devices.

In a further aspect of the invention, the harnessing frame comprises a plurality of gripping pins able to be hooked to the gripping apparatus.

In this way the hooking and lifting of the harnessing frame is facilitated.

In a further aspect of the invention, the gripping apparatus comprises a plurality of lift forks, each of which is able to engage a respective gripping pin and to lift the harnessing frame.

With this solution a simple and compact system is obtained, actuatable in a very rational way, which enables hooking and lifting the gripping pins of the harnessing frame.

In a further aspect of the invention, each lift fork is associated to the support frame by means of a hinge joint.

In this way the forks are prevented from having other movements apart from rotation with respect to the hinge joint.

In a further aspect of the invention, each lift fork is rotated about an axis of the hinge joint by means of an actuating mechanism, between a gripped position, able to facilitate insertion of the pin in the lift fork, and a raised position, able to maintain the harnessing frame raised from the rest surface of the wheels.

In this way it is possible to hook, lift and release the harnessing frame with an annexed device, maintaining the multi-functional carriage on the rest surface.

In a further aspect of the invention, at least a wheel is motorized.

With this solution the multi-functional carriage can be moved without exertion.

In a further aspect of the invention, the multi-functional carriage comprises a steering guide able to guide the multi-functional carriage.

In this way the multi-functional carriage is provided with a device that is easy to use for directing the control of the advancement velocity.

In a further aspect of the invention, the multi-functional carriage comprises a clutch able to disengage the internal combustion engine so as to enable supply to the multifunctional carriage via an electricity grid.

In this way, where a connection to the electricity grid is available, the internal combustion engine is left off, thus avoiding the production of exhaust gases, which is an important aspect in a case where a room is not ventilated.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will emerge from a reading of the following description, provided by way of non-limiting example with the aid of the figures illustrated in the appended tables of drawings.

FIG. **1** is a front orthographic view of the multi-functional carriage.

FIG. **2** is a rear orthographic view of the multi-functional carriage.

FIG. **3** is a view from above of the multi-functional carriage.

FIG. **4** is an orthographic view of the harnessing frame hooked to the grip-ping apparatus.

FIG. **5** is a lateral view of the lift fork.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With particular reference to these figures, **100** denotes in its entirety a multi-functional carriage able to be housed internally of a load compartment of a vehicle.

The multi-functional carriage **100** comprises a support frame **200** to which is associated a gripping apparatus **300** able to engage and raise a harnessing frame **400**, which in turn can be associated to any device to be transported.

The support frame **200** comprises a vertical structure **230** and a horizontal base **210** that can be rested on a ground surface by means of a plurality of wheels.

It is specified that in the present description the terms "horizontal" and "vertical" are used with reference to the condition in which the base is resting on a horizontal surface.

The horizontal base **210** comprises a pair of straight longitudinal members **211**, parallel to one another and joined by means of a first cross-member **212** and a second cross-member **213** perpendicular to the longitudinal members **211**.

The second cross-member **213** is straight and coplanar to the longitudinal members **211**, while the first cross-member **212** comprises two L-shaped end elements having the connection portion to the longitudinal members **211** orientated horizontally and the other portion facing vertically upwards, i.e. in an opposite direction to the rest surface. The two end elements are joined by means of a straight intermediate bar.

The first cross-member **212** is positioned at an end of the longitudinal members **211**, which will define the rear end, while the second cross-member **213** is positioned between the first cross-member **212** and half of the length of the longitudinal members **211**.

The first longitudinal member, the second longitudinal member and the second cross-member **213** define a load compartment **214** having a rectangular plan, in which the various devices are housed.

In particular the load compartment **214** is laterally delimited by the longitudinal members **211** and posteriorly by the second cross-member **213** and by the vertical frame, while it remains frontally and superiorly open.

The components of the horizontal base **210** described up to the present point can consist in straight beams having a hollow rectangular section with the exception of the first cross-member **212** which has a C section.

Previously reference has been made to the fact that the base comprises wheels for resting on the ground. In this regard, the wheels of the horizontal base **210** can be three in number: two front **215** and one rear **216** (see FIG. **2**).

The front wheels **215** can be positioned, one per longitudinal member, at the front end of the longitudinal members **211**, i.e. opposite the end where the first cross-member **212** is present.

The front wheels **215** belong, for example, to the category of the idle wheels and are associated to the longitudinal members **211**, by means of wheel brackets **217**, comprising flat plates provided with a hole able to house a wheel pin **218**.

The rear wheel **216** can be associated to a shelf **221** fixed projectingly to the first cross-member **212**. In particular the rear wheel **216** can be motorized and able to rotate by 360° so as to facilitate the displacement of the multi-functional carriage **100**.

Two vertical uprights **221** extend from the upper plane of the shelf, which function as a support for a steering guide **223**, provided with handles, able to comprise the commands for the guiding of the multi-functional carriage **100**.

The horizontal base **210** further comprises a pair of slots **219**, formed for example by C-shaped bars inferiorly fixed to the first longitudinal member, able to guide the forks of a fork-lift truck should it be necessary to displace the multi-functional carriage **100** using the truck.

The vertical structure **230** is associated to the horizontal base **210**, to which vertical structure **230** are associated, for example: an internal combustion engine **501**, an electricity generator **502** provided with a clutch **503** able to disconnect the electricity generator from the internal combustion engine **501**, and an air compressor **504** provided with a compressed-air tank **505** (see FIG. **3**).

This vertical structure **230** is positioned at the horizontal base zone **210**, comprised between the first cross-member **212** and the second cross-member **213**; it comprises a base chassis **231**, rested on the cross-members **212** and **213**, and on the longitudinal members **211**, from which vertical columns **232** extend, positioned in the corners of the base chassis **231**, which support a rest plane **233** able to function as a support for the internal combustion engine **501**, the current generator **502** and the air compressor **504**.

The multi-functional carriage **100** further comprises the gripping apparatus **300**, which is provided for example with two front lift forks **311** and two rear lift forks **312**, able to hook the harnessing frame **400**.

The front lift forks **311** can be positioned at the front ends of the longitudinal members **211**, while the rear fork **312** can be positioned at the second cross-member **213**.

The lift forks **311**, **312** comprise for example a flat plate, having an indicatively elongate rectangular plane, having, on an end thereof a V-shaped recess, which determines a concavity **313** provided with a lower arm **314** and an upper arm **315** able to hook the harnessing frame **400** (see FIG. **5**).

A hole **316** is present on the other end, enabling inserting a pin **322** which enables rotation of the lift fork **311**, **312** with respect to the support thereof according to a horizontal rotation axis.

The lift forks can be hinged to the respective supports by means of hinge joints **320**, comprising for example brackets **321** provided with holes for housing the pin and orientated in such a way that the lift forks **311**, **312** can rotate about the

axis of the hinge **320** lying on a vertical plane, which is perpendicular to the rest surface and parallel to the longitudinal members **211**.

Further, the rear lift forks **312** can be connected to one another by means of a connecting rod **323** which can cause the rear lift forks **312** to move contemporaneously and which means only one activating means is required for both.

The gripping apparatus **300** further comprises an actuating mechanism **330**, associated to an end of the vertical structure **230** and, at the other ends, to the connecting rod **323**, able to command the rotation of the rear lift forks **312**.

The actuating mechanism **330** can for example comprise a manual winch provided with a pulley on which a cable winds and is associated at an end thereof to the connecting rod **323**. The pulley can be provided with a crank for commanding rotation thereof, and therefore the winding and unwinding of the cable.

The harnessing frame **400** comprises a perimeter border **401**, constituted for example by straight tubes having a hollow rectangular section, able to surround the base of whichever device and to be fixed thereto.

The perimeter border **401** can be provided with fourth gripping pins **402**, one for each lift fork **311**, **312**, able to be hooked by the gripping apparatus **300**, which can be connected to the perimeter border **401** by means of brackets **403**, able to cause the gripping pins **402** with respect to the perimeter border.

The functioning of the multi-functional carriage **100** as described above is as follows.

Firstly, the device that is to be transported by means of the multi-functional carriage **100** must be provided with a harnessing frame **400**, which can be associated to the device by welding or can be bolted.

Once the device is ready for transporting, the multi-functional carriage **100** is moved in such a way as to insert the harnessing frame **400** together with the device fixed thereto, internally of the load compartment **214**.

During this operation the lift forks **311**, **312** are in a gripped position, in which the concavity **313** of the fork is horizontally facing and on the same height level as the gripping pin **402**.

When all the gripping pins **402** are coupled to the lift forks **311**, **312**, the lifting of the device can be proceeded to.

The actuating mechanism **330** is actuated in such a way that the rear lift forks **311** rotate about the pin axis **322**, describing an arc of about 90°, passing from the gripped position to the raised position, in which the concavity **313** of the lift fork **311**, **312** is orientated vertically upwards.

During the lifting, the lower arms **314** of the rear forks **311** push on the rear gripping pins **402**, and raise them vertically while at the same time horizontally translating them towards the rear part of the multi-functional carriage **100**.

During this step, the front forks **312** perform the same rotation as they are kinematically connected to the rear forks **311** by means of the perimeter border **401** of the harnessing frame **400**.

The gripping pins **402** push on the upper arms **315** of the rear lift forks **311**, causing rotation thereof about the pin axis **322**.

When the lift forks **311**, **312** are in a raised position, the gripping pins **402** are pressed to the bottom of the concavities **313** by the weight of whichever device to which they are associated and the carriage can be moved.

When it is necessary to deposit the device present in the load compartment **214** on a ground surface, the actuating mechanism **330** is actuated in such a way that the rear lift forks **311** rotate about the pin axis **322**, describing an arc of about 90°, passing from the raised position to the gripped position.

In this way interchangeable modules can be included, each provided with its own harnessing frame **400**, containing various devices that can be displaced by means of a single multi-functional carriage **100** already provided with the basic apparatus such as the electricity generator **502** and the air compressor **504**.

For example, it is possible to equip a module for replacement of motor vehicle tires, comprising a tire changer and a balancer, or a module for replacing articulated lorry tires, comprising a tire changer and a balancer that are dimensioned for large-dimension tires, or a module for washing cars, comprising a water cleaner, a vacuum cleaner, a steam machine and tanks, or a module for performing services, comprising tools, replacement parts and tanks.

The invention as it is conceived is susceptible to numerous modifications, all falling within the scope of the inventive concept and although a use thereof has been described in mobile workshops, it ca also be used in traditional workshops.

Further, all the details can be replaced with other technically-equivalent elements.

In practice the materials used, as well as the contingent shapes and dimensions, can be any according to requirements, without forsaking the scope of protection of the following claims.

The invention claimed is:

1. A multi-functional carriage (**100**) comprising:

a support frame (**200**) provided with wheels;

an internal combustion engine (**501**) able to actuate an air compressor (**504**) and an electrical current generator (**502**), wherein the internal combustion engine (**501**), the air compressor (**504**) and the electrical current generator (**502**) are installed on-board the support frame (**200**);

wherein the support frame (**200**) comprises a gripping apparatus (**300**) able to engage and raise a harnessing frame (**400**) for various devices,

wherein the harnessing frame (**400**) comprises a plurality of harnessing pins (**402**) able to be hooked to the gripping apparatus (**300**), and wherein the gripping apparatus (**300**) comprises a plurality of lift forks (**311**, **312**), each of which is able to engage a respective harnessing pin (**402**) and to lift the harnessing frame (**400**).

2. The carriage of claim **1**, wherein the harnessing frame (**400**) comprises a perimeter border (**401**) fixable to the devices.

3. The carriage of claim **1**, wherein each lift fork (**311**, **312**) is associated to the support frame (**200**) by means of a hinge joint (**320**).

4. The carriage of claim **3**, wherein each lift fork (**311**) (**312**) is rotated about an axis of the hinge joint (**320**) by means of an actuating mechanism (**330**), between a gripped position, able to facilitate insertion of the pin in the lift fork (**311**, **312**), and a raised position, able to maintain the harnessing frame (**400**) raised from the rest surface of the wheels.

5. The carriage of claim **1**, wherein at least a wheel is motorised.

6. The carriage of claim **1**, further comprising a steering guide (**223**) able to guide the multi-functional carriage (**100**).

7. The carriage of claim **1**, further comprising a clutch (**503**) able to disengage the internal combustion engine (**501**) so as to enable supply to the multi-functional carriage (**100**) via an electricity grid.

* * * * *